

REMARKS

In response to the Office Action mailed April 6, 2004 claims 8 and 18 are amended. Claims 1-7 and claims 21-40 were previously cancelled, without prejudice, pursuant to a restriction requirement. The Examiner refused to consider certain references submitted by the applicants in an Information Disclosure Statement (IDS) filed on August 30, 2000. The Examiner refused to consider References AT-AZ (all prior art publications) because the applicants did not list the title of these references (authors and journal information was provided). The applicants note that form PTOL-1449 states that the title of the referenced publications is optional. Therefore, applicants are somewhat surprised that the Examiner found this to be an adequate basis for refusing to consider these references. In light of this observation, applicants respectfully request that the Examiner reconsider his decision. Also, the Examiner did not place his initials by reference BA. The Examiner did not identify reference BA as a reference he refused to consider.

Although applicants believe that the Examiner's refusal to consider certain references with the original IDS was improper, applicants submit a new IDS to avoid delays in further examination of this case. Applicants resubmit reference BA with this new IDS, although it does not appear that the Examiner refused to consider this reference in the first instance.

The Examiner rejected applicants' claims 19-20 under 35 U.S.C. § 112. Specifically, the Examiner states that claim 19 improperly depends from claim 8, in that claim 19 recites a plurality of the devices recited in claim 8. The Examiner argues that claim 19 is broader than claim 8 and therefore improperly depends therefrom. Applicants disagree. Since claim 8 is drafted using the words comprising, it would appear to be the broader claim, since it encompasses any device that has one

or more of the claimed structures. Claim 19, on the other hand appears to be narrower, since it requires a plurality of such structures and therefore does not include a single structure within its scope.

Applicants have amended claim 19 to place it in independent form. The applicants respectfully request the Examiner to acknowledge that the amendment was not necessary since claim 19 is indeed narrower than claim 8. More importantly, the applicants would appreciate the Examiner's acknowledgement that, since the amendment was not necessary to begin with, the amendment was not made for the purposes of patentability.

Applicants' invention is directed to microwave vacuum tube devices and, in particular gridded microwave tube types. The device comprises a substrate, a cathode, attached to the substrate, a grid attached to the substrate and an output structure. The cathode and grid are substantially parallel. One or both of the cathode and grid are attached to the device substrate by flexural members. In the operation of the device, a weak microwave signal to be amplified is applied between the grid and the cathode. The signal applied to the grid controls the number of electrons drawn from the cathode. During the positive half of the microwave cycle, more electrons are drawn. During the negative half, fewer electrons are drawn. The modulated beam of electrons passes through the grid and goes to the anode. A small voltage on the grid controls a large amount of current. As this current passes through an external load, it produces a large voltage, and the gridded tube thereby provides gain. See page 10, line 22 to page 11, line 2 of applicants' specification. Thus, in applicants' device, the grid controls electron emission from the cathode. See page 2, lines 1-3 of applicants' specification. The embodiments of applicants' device in which both an anode and cathode are present are inherently three terminal devices (one for the cathode, a second

for the anode and a third for the grid). Applicants' device is easily extended to more than three terminals (by using multiple grids).

The Examiner rejected claims 8-11 under 35 U.S.C. § 102(b). The Examiner cites US Patent No. 5,536,988 to *Zhang et al.* (*Zhang et al.* hereinafter) as the basis for this rejection.

*Zhang et al.* is directed to a process for making field emission devices. Although *Zhang et al.* describes a device having both a grid and a cathode attached to a substrate, *Zhang et al.* does not describe a device in which the grid modulates the electrons drawn from the cathode. The grid (282) in *Zhang et al.* is merely a support structure and provides no modulating function.

In their previous reply, applicants observed a fundamental distinction between their invention and the *Zhang et al.* device. Applicants captured this distinction by amending claim 8 to recite that the grid is configured to modulate the electrons drawn from the cathode. The Examiner recognized this distinction in the April 6, 2004 office action, but refused to give the language patentable weight because the limitation was crafted in functional form. Claim 8 has been further amended in this response. The functional limitation to which the Examiner objected has been deleted and the claim has been further amended to recite a cathode emission control grid. Support for this amendment is found on page 2, lines 1-4 of applicants' specification. This feature is clearly not disclosed or suggested by *Zhang et al.* Since *Zhang et al.* does not disclose or suggest a gridded microwave tube device wherein the grid controls cathode emission, *Zhang et al.* clearly does not anticipate applicants' amended claim 8.

In the April 6<sup>th</sup> Office Action, the Examiner stated that claim 8 must be amended to recite the functional language in means plus function form to warrant the presence of the

functional language. Applicants regard this observation as moot, since applicants have amended the description of the grid to a cathode emission control grid. Applicants submit that this amendment obviates the need to amend the language in means plus function language.

With regard to claims 9-11, these claims are also patentable over *Zhang et al.* for the aforesaid reasons. Specifically, claims 9-11 depend from claim 8. Claim 8 is patentable over *Zhang et al.* for the reasons previously stated reasons. Claims 9-11 are therefore patentable by virtue of their dependence on Claim 8. Furthermore, the Examiner incorrectly asserts that *Zhang et al.* describes cathode and grid surfaces substantially perpendicular to the device substrate. The emission surface of the cathode in *Zhang et al.* is clearly parallel to the substrate, not perpendicular thereto. See emitter tip 304 in FIG. 8(e) that emits in a direction perpendicular to substrate 12 because the emission face is in a plane parallel to substrate 12. Thus, the applicants respectfully request that the Examiner withdraw his rejections of claims 9-11 based upon the fact that these claims depend from claim 8 and because the Examiner's basis for rejecting claim 10 and 11 is incorrect.

The Examiner also rejected claims 12-14 as unpatentable under 35 U.S.C. § 103(a). Specifically, the Examiner states that claims 12-14 are obvious in view of the combination of *Zhang et al.* in view of *Komatsu*.

At the outset, applicants note that the Examiner has failed to make a *prima facie* case for obviousness based on this combination of references. Specifically, the Examiner has not indicated any suggestion or motivation in the references themselves to combine the teachings of *Zhang et al.* and *Komatsu*. Pursuant to MPEP 706.02(j), the Examiner is required to set forth an explanation of the reasons why one of ordinary skill in

the art at the time the invention was made would have been motivated to make the proposed modification.

The motivation for the combination put forth by the Examiner certainly does not come from *Zhang et al.*, which describes a gridded support structure. Given the placement of the cathode on the support structure, it is difficult to understand how it could be obvious to modify the support structure in *Zhang et al.* to perform an electrode function.

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Furthermore, there is no motivation from either reference to make the support grid in *Zhang et al.* anything other than a support structure. Certainly there is no such suggestion in *Komatsu*. In *Komatsu*, the "grid" electrode 6 (e.g. FIG. 7) does not perform a support function. Therefore applicants see no motivation from the references themselves that would cause one skilled in the art to modify the support grid in *Zhang et al.* to perform the additional function of controlling emissions from the cathode. The applicants submit that the Examiner's rejection is improper and should be withdrawn. To the extent that the Examiner refused to consider the prior amendment to claim 8 when making this rejection, applicants submit that currently amended claim 8, which recites a device having a cathode emission control grid, is not rendered obvious by the combination of *Zhang et al.* in view of *Komatsu*.

The Examiner rejected claim 15, stating that the claim is obvious under 35 U.S.C. § 103(a). The Examiner cited *Zhang et al.* in view of *Bower* as the basis for his rejection. At the outset, applicants again note that claim 15 depends from claim 8. Claim 8 is patentable over *Zhang et al.* for the aforesaid reasons. Therefore claim 15 is patentable over the cited combination of reference by virtue of its dependence on claim 8.

The Examiner rejected claims 16, 17, 19 and 20, stating that the claims are obvious under 35 U.S.C. § 103(a). The Examiner cited *Zhang et al.* as the basis for his rejection. At

the outset, applicants again note that claims 16 and 17 depend from claim 8. Claim 8 is patentable over *Zhang et al.* for the aforesaid reasons. Therefore claims 16 and 17 are patentable over the cited combination of references by virtue of their dependence on claim 8. Furthermore, these claims are not rendered obvious by *Zhang et al.* because these claims recite a surface area of the cathode and a spacing between cathode and grid, respectively. As noted by applicants in their previous reply, the only dimensions described in *Zhang et al.* are the thickness of layers used to form the support structure on which the emitters are formed. *Zhang et al.* does not disclose or suggest a distance between the cathode and the grid.

With regard to claims 19 and 20, claim 19 has been amended to be in independent form, as previously noted. Claim 19 is also amended to further describe the grid as a cathode emission control grid. For the previously stated reasons, *Zhang et al.* does not disclose or suggest a vacuum microelectromechanical device having a cathode emission control grid. Claim 20 is patentable over *Zhang et al.* by virtue of its dependence from claim 19.

In view of the foregoing arguments and amendments, applicants submit that claims 8-20 are in condition for allowance. Favorable action is respectfully requested.

As it is believed that all of the rejections set forth in the Official Action have been fully met, favorable reconsideration and allowance are earnestly solicited.

If, however, for any reason the Examiner does not believe that such action can be taken at this time, it is respectfully requested that he telephone applicants' attorney at (908) 654-5000 in order to overcome any additional objections which he might have.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 12-1095 therefor.

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Respectfully submitted,

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